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ABSTRACT

To determine the degree of inequity operative between more progressive and less progressive farmers in Tetu, Kenya, baseline data from a 1970 survey of randomly selected farmers (N=354) were compared with data derived from a 1973 survey of 341 of the same respondents. Using the 1970 criteria for progressiveness (most progressive, upper middle, lower middle, and least progressive), the socioeconomic status of Tetu farmers was examined for 1973 in terms of: total and agricultural income; average number of laborers in different types of employment; percent owning selected household items; percent giving at least one child primary or secondary education; mean number of extension contacts; and frequency of visits to a Farmer Training Center. Indicators used to examine inequities were: diffusion of innovations; quality of innovations; scale at which farmers innovated; farm size; and sources of information. Results indicated: considerable disparity between the socioeconomic status of the progressive and the less progressive farmer; rapid diffusion of hybrid maize and grade cattle; no discernible deterioration in the quality of innovation or the scale of operations as the less progressive farmers adopted; greatest increases in farm size among the smallest farmers; and no discernible monopolization of information sources by the more progressive. (JC)

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SMALL FARMERS ON THE MOVE: RESULTS OF A PANEL STUDY IN RURAL KENYA

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ABSTRACT

A research team from the University of Nairobi carried out a field experiment in Tetu, a sublocation in a very progressive area in Kenya, for a period of three years. Work started with a 1970 baseline survey of a random sample of 354 farmers. In 1973, a second survey was carried out of the same respondents (341). The present paper reports: 1) the additional snapshot information collected in the 1973 survey, especially data on socio-economic status; and 2) a comparison between 1970 and 1973 on selected indicators. The results of the field experiment proper have been reported elsewhere.

In 1970, considerable inequity between more and less progressive farmers had been observed. The data on socio-economic status collected in 1973 bear this out. The writers expected to find evidence of rapidly increasing inequity in their comparison between 1970 and 1973. The comparison did, however, NOT confirm this hypothesis for the indicators studied:

- a very rapid diffusion of hybrid maize and grade cattle took place, also to less progressive farmers.
- The quality of the innovation which farmers adopt does not seem to deteriorate as less progressive farmers start to adopt.
- The scale at which farmers adopt does not seem to deteriorate as less progressive farmers start to adopt.
- The smallest farmers have been relatively most successful in increasing their farm sizes.
- The more progressive have not increasingly monopolised sources of information.

Data on labor use might, however, be interpreted to signify increasing use of local labor by more progressive farmers. Given also the clear indication of existing disparity, the authors feel that other factors than the ones they studied may explain the disparities. Further research remains necessary.

INTRODUCTION*)

The research reported in the present paper is a by-product of a larger project. This "Tetu project" was part of the Kenya Government's "Special Rural Development Programme" which aimed at the experimental development of replicable prototype strategies for rural development in six administrative divisions (see Uma Lele, 1975, for a fuller account).

In Tetu Division, we accordingly conducted: 1) a baseline study of 354 randomly selected farmers and 2) a field experiment to develop and test improved extension strategies for reaching the "forgotten farmers", i.e., less progressive farmers who had sofar been bypassed by the various Government services. The results of the project have been reported elsewhere (Ascroft et al, 1971; Ascroft et al, 1973; Röling, 1973; Röling, 1974; and Röling, Ascroft and Chege, 1976).

Since the baseline study, conducted in 1970, was carried out on a carefully chosen random sample with a carefully tested instrument and had provided systematic results, and since the "Tetu team" remained in the field for three years after the baseline study to help conduct and evaluate the field experiment, the opportunity presented itself to carry out a second survey of the farmers who were interviewed in November 1970, in March 1973. Thus we could obtain a diachronic view: two measurements in time instead of a snapshot. Also, the second survey gave us the opportunity to collect some additional snapshot information which we had not obtained in 1970. It must be said here that the second survey was an afterthought which occurred to us only in 1972, so that the 1970 survey was not designed with a panel study in mind.

The purpose of the present paper is to report the additional snapshot information collected in 1973 and the results of the comparison between 1970 and 1973.

PROBLEM

The 1970 baseline had shown a strong correlation between "progressiveness" (the number of agricultural innovations adopted by a farmer, weighted by the number of years he had been using them) on the one hand, and indicators of wealth and attention from Government services on the other. Since the Tetu area had fairly recently emerged from a relatively egalitarian tribal past, we hypothesised that the large inequities we observed in 1970 could be attributed to innovation diffusion and were only acerbated by the policy of focussing the attention of

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*) The authors wish to aknowledge the helpful comments of professor A.W. van den Ban.

extension and credit services on the more progressive farmers (Röling, Ascroft and Chege, 1976). In our field experiment we therefore tried to develop replicable methods for focussing such service on less progressive farmers.

However, we also remained concerned about understanding the emergence of inequity between small farmers. This concern must be understood against the prevailing situation in Kenya today: population growth is extremely rapid (about 3.6% in such areas as Tetu) and land reserves are diminishing rapidly. Meanwhile, employment outside agriculture is slow in forthcoming. Kisa (1973) estimated that employment in the modern formal sector increases with about 3% per annum, or 22,000 jobs, while the total labor force increases with 3.3% per annum, or about 148,000 people. ILO (1972) expects that 1.1 million additional family farms will have to be created by 1985, of which 700,000 will have to be created in the present small-holder areas.

In short, the time has not come for focussing attention on a core of future commercial farmers in the expectation that the rest will find employment elsewhere. Instead, the future function of the rural areas seems to be act as "holding grounds" in which thousand of rural families can find a reasonable living.

This holding ground function cannot, we believe, be fulfilled if the rural area is characterised by inequitable distributions of income, land, services and power. Such a situation would diminish the viability of the rural area and push more people to urban slums than necessary. It would imply a large landless rural seasonal labor force, unable to produce its own food and living in abject poverty (World Bank, 1975). Such a situation would not optimalise the opportunities for development: apart from the political liabilities, it would increase the number of people who do not participate in, and contribute to, the national economy. It would not make use of the fact that the small family farm makes the most efficient use of scarce resources such as land. Inequity only hampers the rapid diffusion of agricultural and family planning innovations (Hale, 1974; Rich 1972), while it seems to make the organisation of rural people into effective co-operatives more difficult of not impossible.

In short, we believe in equitable rural development and are therefore, concerned with the consequences of the rapid development taking place in Tetu. Is further diffusion of agricultural innovations taking place, or has it stopped after benefitting the more progressive we found using the innovations in 1970? If diffusion takes place, does it imply a trickle down of wealth, or are the

gaps widening in terms of possessions, landowndership, scales of operation, services and opportunities for investment and education? Do the wealthier farmers employ more labor than before?

In short, we were interested to see whether our hypothesis of increasing disparity, formulated on the basis of the 1970 snapshot, held true for a diachronic view (albeit over a period of only 2½ years). We feel our work is also of more general interest, since Tetu is a very progressive area which may have a weathervane function for efforts to predict the trends of development in Africa's fairly egalitarian rural areas.

METHOD

Sampling. All roughly twelve thousand farms in Tetu are registered with the Registration Office in Nyeri. Since the individual farm is our unit of analysis, the list of registered farms provided a comprehensive and reliable sampling frame from which to draw a random sample of Tetu farmers. Of course, the land registry does not list landless farmers. We selected the sample by taking every nth farmer, starting at a random point. In this manner we selected 380 names for the baseline study. Information was eventually gathered on 354 farmers. Much of the attrition occurred because more than one farm was sometimes registered in the name of one farmer. In such cases, we amalgamated the multiple farms into the unit.

We tried to revisit all baseline farmers for the second survey. As could be expected, it was impossible to find all of them. Some had moved away for city employment, some had died, some farms had been amalgamated into larger units, while others had been inherited by a number of sons and broken up. We finally were able to interview 341 respondents, or 96.3% of the baseline farmers and 89.7% of those originally sampled.

Data collection. The data for the 1970 baseline and the 1973 survey were gathered via a precoded interview schedule. Both schedules were extensively pretested before their use. The baseline study was administered by four specially chosen and trained Agricultural Assistants under our supervision. In 1973, the same assistants were assigned to us by the courtesy of the Ministery of Agriculture. However, they were reinforced by three trained interviewers of the Institue for Development Studies of the University of Nairobi, and a field supervisor from the same Institute who knew the area well and had previously worked with the

Ministry of Agriculture. The quality of the interviews was extremely high, with hardly any incidence of missing data.

Data processing and analysis. Coding, card punching and data processing occurred under the expert supervision of the Data Processing Unit at the University of Nairobi. The analysis for the present paper was carried out with the assistance of the facilities of the University of Utrecht in Holland. We are indebted to both Universities for this assistance.

The dependent variable. We use as our dependent variable "progressiveness" or "innovativeness", i.e., the degree to which an individual is relatively earlier than comparable others in adopting innovations (Rogers and Shoemaker, 1971, p.27). We operationalised this concept for the 1970 data by constructing an index according to which each respondent was assigned a score which is the sum of the number of years (up to 1970) he had been using any of eight innovations promoted by the Ministery of Agriculture[1)]. A farmers scored higher if he had adopted more innovations, and adopted them earlier, than others.

We grouped the 1973 respondents into four categories on the basis of these 1970 scores as follows:

most progressive	27%	93
upper middle	28%	94
lower middle	28%	97
least progressive	17%	57
	100%	341

The categories reflect an effort to create 4 more or less equal groups on the basis of natural cutting points in the sequence of scores. Of the 13 people we "lost" in 1973, 11 were either lower middle or least progressive farmers.

As is the case with most operationalisations, one can question whether the progressiveness score measures "real" progressiveness (Suurs, 1975). The eight innovations are not equally applicable to all ecological zones in Tetu, (Röling, 1972), although tea in the high areas does, to some extent, offset coffee in the lower areas. Theoretically our operationalisation allows a modern farmer who

1) Thus an innovation adopted in 1967 contributed to the score: 1970-1967 = 3. We add 1 (to make it 4) to allow discrimination between a farmer who has adopted an innovation in 1970 and one who has not. The innovations were: hybrid maize, coffee, tea, macadamia, grade cattle, pyrethrum, certified potatoes, and pigs.

built a pig breeding unit with 200 sows in 1965 to be less progressive than a peasant who planted five sickly coffee bushes in 1964. Luckily, the farming system in Tetu is fairly homogeneous. The score does (and should) not reflect the scale of operations, in that the peasant who planted the five coffee bushes in 1974 gets the same score as one who planted 200 in the same year.

Such and other considerations allow our operationalisation of progressiveness to be criticised in that it leaves open the possibility that two farmers get the same score although they may not be equally progressive "in reality". We do not know, of course, to what extent this is true, although the systematic nature of our 1970 results (Ascroft et al, 1973) gives us confidence that our measure of progressiveness is a useful one.

We therefore use the 1970 progressiveness score also as the dependent variable for the results of the 1973 snapshot and for the comparison of 1970 and 1973. Thus a farmer remains classified in his 1970 progressiveness category also when we use 1973 data on his farm.

We did, of course, try to construct a 1973 progressiveness index, but discovered that we ran into a great number of problems, such as difficulties in selecting comparable cutting points[1)], difficulties in replicating 1970 coding decisions, etc. This failure means that we shall not be able to indicate whether farmers changed their relative positions in terms of progressiveness, one of our original objectives when planning the panel study. Our analysis design now assumes that respondents stayed in the same progressiveness category between 1970 and 1973. If we may rationalise a bit, we believe this to be a plausible assumption after all, since a farmer's innate ability, resource endowment, attention from Government services and decision making in the past ten years are unlikely to change a great deal in 2½ years[2)].

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1) every resp. would automatically obtain 3 years extra for every innovation he had adopted, and was still using.

2) There may, however, be some interesting exceptions, such as the person who has recently taken up farming after having spect several years as a houseservant in a city. He might change enough points in a few years to end up in a different category.

THE SMALL FARMER IN TETU

The present section focusses on the description of the Tetu farmer, mainly on the basis of the 1973 snapshot results. We had found in 1970 that average farm-size was 6 acres or 2.4 hectares, only 12% having more than 10 acres (4 ha) and 3% having more than 20 acres (8 ha). We are then, dealing with small farmers and the relative differences between them. In Tetu one finds no haciendas, except the coffee farm of the Mission. When land adjudication and registration had been completed in the area in 1959, each farmer had one consolidated parcel of land. In 1970, we found that 38% of the most progressive had at least two parcels of land, as against only 5% of the least progressive. This finding left open two possibilities: that progressive farmers become rich and can then buy more land, or that farmers who inherit more land become progressive.

We therefore asked in 1973, whether the respondent had acquired land through purchase. About twice as many (61% versus 33%) most progressive as least progressive had purchased land. The finding seems to support the hypothesis that more progressive farmers find more opportunities to increase their farmsize through purchase than do the less progressive.

A similar conclusion can be drawn regarding other investment. It turns out that about one-quarter (26%) of all Tetu farmers are investing in shares of "group purchased farms". The system works as follows: A large, non-Kenyan-owned farm, is taken as the intended target of purchase. The law requires that the farm is sold, if Africans who have the money request to buy it. Small farmers thus form a company or a cooperative which sells shares towards the purchase of the farm. Such a farm finally ends up having hundreds of owners and is fragmented accordingly, unless the Ministry of Lands and Settlement takes special precautions. Other forms of investment are shops, businesses such as transport, and shares in commercial companies. Of the most progressive, 60% had invested in at least one enterprise versus 25% of the least progressive, the other two categories falling systematically in-between.

In the Kikuyu's struggle to get ahead, credit plays an important role. The difficult part is to get to the point where one gets credit. Once one can obtain a fairly large loan, one can make accelerated progress. About one-fifth (21%) of the Tetu farmers had acquired loans. Of the 70 farmers receiving loans, half (33) are most progressives. The average amount of credit received by them (Kshs 12850) is more than ten times the average received by the four least progressives who received a loan (Kshs 1200), the other categories falling

systematically in between.

Of the sources of institutional credit, the Agricultural Finance Corporation(AFC) is the most important one. It is the parastatal body in charge of providing agricultural credit from such funds as IDA. Half (35) of the 70 farmers receiving credit had obtained an AFC loan. Most (20) of these went to most progressive farmers. Other sources of institutional credit mentioned are cooperatives, commercial banks and SRDP. In fact, three of the four least progressives who obtained a loan got it through SRDP. Twenty people in other categories received an SRDP loan, 12 of whom are most progressives. Although not all of these loans had been channeled through our project (there also being an SRDP 4K loan scheme), the figures show how difficult it is to reach the least progressive or lower middle categories.

The average annual income from agriculture was Kshs 1184 ($ 166). Table 1 shows that 62% of the most progressive earned Kshs 1000 or more[1)] from agriculture, as against 7% of the least progressives, the other two categories falling systematically in between. The most progressive averaged 2125 shillings, the least progressive 337.

Table 1: Income from agriculture reported in 1973, by progressiveness in 1970

Income in Kshs	0 - 250	251 - 1000	1001 - 2000	2001 and +	TOTAL	MEAN
most progressive	11%	28%	26%	36%	100%	2125
upper middle	17	40	25	17	100%	1218
lower middle	38	36	16	10	100%	745
least progressive	70	23	2	5	100%	337
Total Percent	31%	33%	19%	18%	100%	1184
Base	104	112	63	62	341	

X^2 = 89.85
p = .0000

1) Kf = 20 Kshs = $ 2.80. The Kenya pound is pegged to the dollar, and devaluated with it.

Agricultural income was measured by asking the respondent the annual return from his various agricultural enterprises and summing the answers. We are thus dealing with self-reported income, measured in a manner which would horrify the farm management specialist or agricultural economist who usually try to minimize measurement error, be it at the cost of sampling error. Our measure of agricultural income only refers to cash returns from selling farm products and does not take the value of subsistence production into account[1].

Total income was measured by adding agricultural income to other specified income items. The average self-reported total income is Kshs 2342, or $ 328. Assuming an average family size of six, this amounts to about $ 5 more than the arbitrary $ 50 (Kshs 357) per capita below which the World Bank (1975) speaks of "absolute poverty". However, about two-thirds (63%) make less than Kshs 2000 (which amounts to less than $ 50 per caput, still assuming a family of six). Of the one-third (36%) who make Kshs 2000 or more, 41% are most progressive.

If one compares the average agricultural income with the average total income, one notices that the least progressive derive a much greater percent of their total income from sources outside agriculture than the most progressive. In fact, 62% of the total income of the latter derives from agriculture, while that is only 25% in case of the former.

Yet, as Figure 1 shows, all categories seem to supplement their incomes with roughly the same amount from non-agricultural sources. It is also of interest to note (Figure 2) that especially the percentages of people in the Lower Middle and least Progressive categories who make Kshs 250 or less from agriculture is considerably decreased if one takes total income into account. Thus 70% of the least Progressive make less than Kshs 250 from agriculture, but only 26% has a total income less than that amount. How do less progressive farmers add to their income? A likely source is labor for other farmers (Table 2)[2].

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1) The fact that we speak of surplus becomes evident if one looks at the agric. income per acre: for the most progressive this is Kshs 236. For the other categories respectively Kshs 164, 155 and 99.

2) As other studies of small farmers often also show considerable earnings from non-agricultural sources, it seems worthwhile to pay more systematic attention to this factor in adoption/diffusion studies. In the present study, we found, for instance, that the average Tetu farmer received Kshs 471 from relatives! That is slightly less than one-fifth of their total income and may represent a substantial income redistribution.

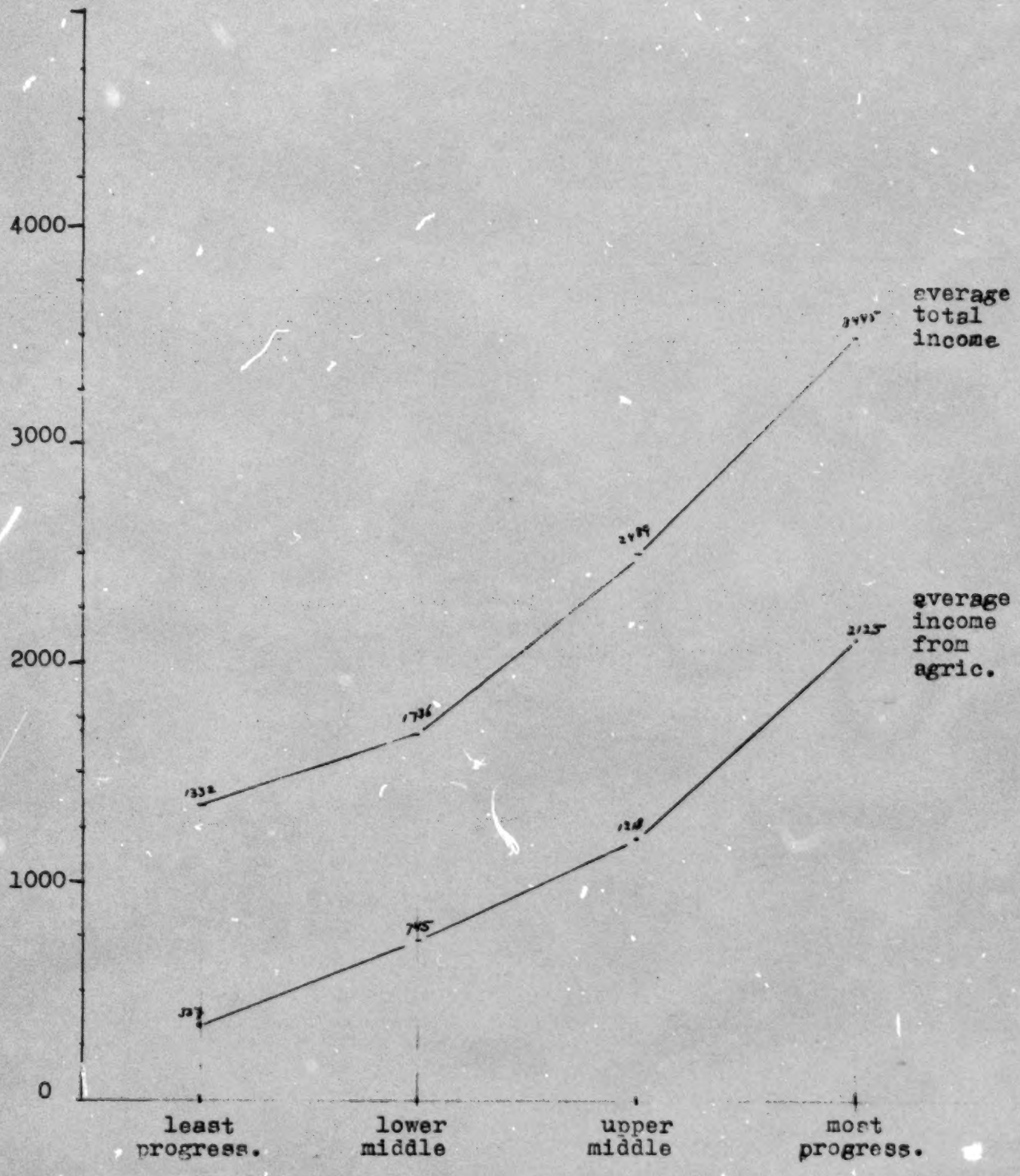

FIGURE 1: Comparison of average income from agriculture and average total income, per progressiveness category.

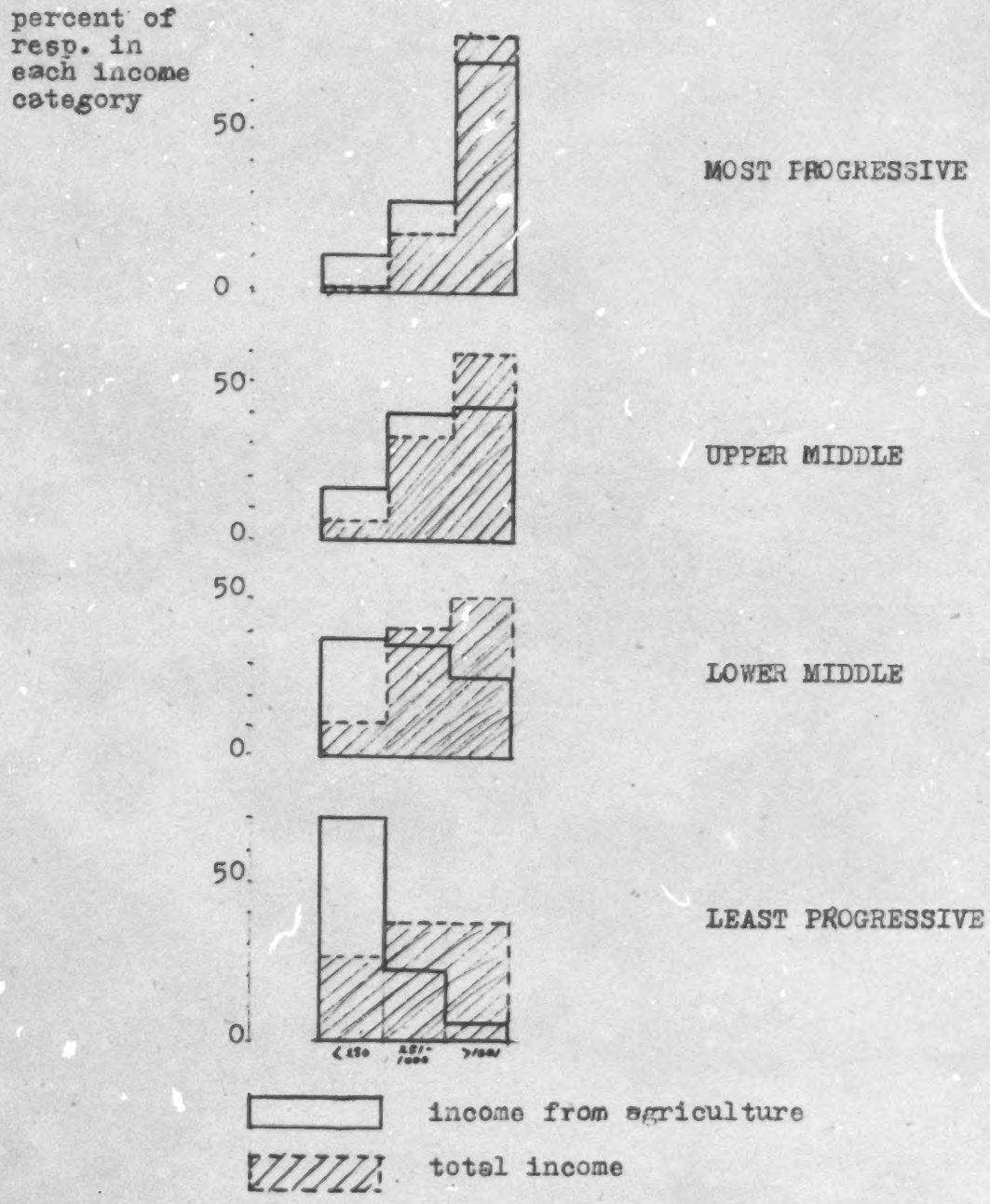

FIGURE 2: Percentages of farmers in different income brackets per progressiveness category.

Table 2: Average number of laborers of different types employed in 1973, by progressiveness in 1970

Type of labor	full time*)	part time*)	seasonal*)	household
most progressive	.4	.8	3.1	2.5
upper middle	.2	.5	2.4	2.8
lower middle	.1	.3	1.7	2.3
least progressive	.0	.0	0.7	1.9
TOTAL	.2	.4	2.1	2.4

*) X^2 significant at the .001 level for underlying contingency tables

The table shows a fairly heavy labor use among the more progressive categories. Thus the most progressive employ nearly one part-time laborer and about three seasonal laborers each. We come back to labor use later on.

To get an impression of the type of life the Tetu farmer leads, it is interesting to look at his various possessions. Whereas anthropologist Jomo Kenyatta (1938) could still describe one Kikuyu house as the typical one, there is now considerable variation. One finds square wooden houses with iron sheeted roofs, next to the typical round huts with thatched roofs. Yet, three-quarters (75%) of all farmers still have a house of mud walls, while nearly nine-tenths (88%) still has a mud floor. Much change has occurred in the type of roof. Roof type has changed especially as a result of so-called Mabati groups[1], self-help groups of women who hire themselves for farm work, save the money collectively and use the thus accumulated savings in turn to roof the house of one of the members with corrugated iron sheets. Nearly nine-tenths (89%) of the most progressive have iron sheeted roofs, versus about half (53%) of the least progressive.

To have light at night adds to life in a way the westerner has forgotten, but realises whenever he spends a night in the bush. The first British settlers (Huxley, 1959) in Kenya could obtain labor from Kikuyu tribesmen to build their houses by simply putting kerosine lamps arround their camp after which they sat around in the night to wait for eager labor to show up. That was 1913.

1) Mabati = iron sheet

Now, 81% of the Tetu farmers owns a kerosine lamp and the same percent owns a torch. Only two people have electricity and another two use pressure lamps. About one third (35%) use small hand wicker lamps made from tin cans by local blacksmiths. Such lamps are a poor man's solution. More least progressive (43%) use them than most progressive (31%). However, of the most progressive, 89% own a regular kerosine lamp, versus 66% of the least progressive.

All Tetu farmers use an open wood fire to cook their food. However, additional modes of cooking are coming in vogue. About a third (37%) also uses a jiko[1] with charcoal and about a fifth (18%) uses a kerosine stove. Such additional modes of cooking are used especially by the most progressive.

The possession of different types of household items (Table 3) gives a more detailed picture of the wealth of the Tetu farmers and the differentiation between them. The most progressive own an average of 10 of the items, the least progressive 5 (see Total Percent). Especially water tanks to catch roof water and running water were prized possessions when we were in Tetu.

Of selected food items eaten within the last week, sugar and milk were consumed by all farmers (resp. 99 and 96%), eggs and bread by two-thirds (resp. 69 and 66%) and meat of goats or cattle by half (53%). A third (34%) ate chicken and a quarter (25%) rice. Pork, against which a traditional dislike exists, was eaten by only 3%, although pork sausages are gaining increasing popularity amoung well-to-do Kenyans[2]. As can be expected, the most progressive ate considerably more meat, eggs, chicken, fruit, rice and butter than did least progressives. However, also a substantial proportion (88%) of the latter had consumed milk.

In a country where progress has been so strongly linked with education in the minds of local people, it is of interest to take a quick and dirty look at the extent to which Tetu farmers have sent (or do send) at least one of their children to primary or secondary school (Table 4). We say "dirty look" because the percents have simply been taken across all respondents and have not been adjusted for childless farmers, and age. Nor do they account for the percent of a farmer's children which was sent to school, although those who do send any child to school tend to send all of them.

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1) jiko = simple stove made from oil drums by local blacksmiths.

2) Pork, chicken, wheat flour, bread, eggs, milk and sugar, in order of "difficulty", allow the construction of a quasi Guttman scale with a coeff. of reproducibility of .89, a coeff. of scaleability of .49 and a min. marg. repr. of .79.

Table 3: Percent owning selected household items in 1973, by progressiveness in 1970

	most progress.	upper middle	lower middle	least progress.	TOTAL
table	98%	88%	90%	67%	88%
cupboard	95	86	75	61	81%
easy chair	95	75	73	74	80%
book(s)	88	83	78	56	79%
photos/ pictures *)	82	55	53	33	61%
table cloth	72	51	47	44	55%
tea cups	62	45	46	30	48%
magazines	59	36	32	18	38%
watch *)	51	36	35	16	36%
metal bed	50	34	38	7	35%
radio *)	48	31	34	18	34%
crop/ cattle tick sprayer	45	30	27	9	30%
water tank *) (to catch rain)	41	26	21	5	25%
bicycle	36	20	20	12	23%
foam mattress *)	33	19	16	4	19%
sewing machine **)	14	9	7	2	9%
running water	17	6	4	4	8%
glass window *)	15	6	4	2	7%
motor veh. *)	15	5	-	-	6%
TOTAL PERCENT	1016%	741%	710%	462%	762%

*) Items which form a 7-item quasi-Guttman scale with a coeff. of rep. = .89, coeff. of scalability = .55, and mn. marg. repr. = .76

**) The only item of which ownership is not related (X^2) with progressiveness at at least an .01 level of significance.

Table : Percent giving at least one child primary or secondary education by progressiveness in 1970

	primary	secondary
most progressive	77%	43%
upper middle	73%	24
lower middle	62	20
least progressive	44	9
TOTAL	67%	25%

X^2 for both significant at the .001 level.

Primary education only became free in 1972. Before that time, schoolfees constituted one of the important expenditures for which the small farmer required money. The figures show that the most progressive do most of the investing in education. Since it is unlikely that a young man with secundary education takes up peasant farming, and since those who send one child to secondary school tend to send all of them, the figures raise the possibility that two types of people leave the rural areas: the most progressive and least progressive who can not make a living in the rural area. In the long run, this would tend to have an equalising effect on the rural community, though not on the country as a whole.

One of the most manipulable factors associated with progressiveness is contact with extension workers. In the 1970 baseline, we had already found a strong correlation between progressiveness and the extent to which a farmer had been visited al least once since the same time last year (Ascroft et al, 1973). In 1973 we asked respondents to state the frequency of extension contacts in the past year (table 5). The Government workers involved are the Junior Agricultural Assistant (JAA) and the Junior Animal Husbandry Assistant (JAHA).

The JAA is concerned with crop husbandry. His main method of extension is the individual farm visit. Even if one takes the favorable extension: farmer ratio in the area into account (about 1:500), the JAA's are doing a good job, visiting the average farmer about 6 times. The JAHA is mainly responsible for veterinary work and waits till about 9 a.m. for clients with problems to show up. He then goes out to visit them. Although the most progressive have the highest average number of contacts, it is interesting to note the high average of the lower

Table 5: Mean number of extension contacts by progressiveness in 1970

	visits by JAA	visits to JAA	visits by JAHA	visits to JAHA
most progressive	9.4	1.6	2.2	2.8
upper middle	4.9	0.5	1.4	1.4
lower middle	6.9	0.9	2.1	1.5
least progressive	1.7	0.1	0.4	0.5
TOTAL	6.1	0.8	1.7	1.8

The contingency tables on which these figures are based show a relationship (X^2) between extension contact and progressiveness which is at the .0001 level of significance, except visits to JAA which is significant at the .006 level.

middle category which may reflect SRDP's activities to reach the less progressive. Especially the JAA's were involved in the project.

The figures in Table 5 are averages across all farmers. Table 6 shows that about one-third (35%) of all farmers were never visited by the JAA and about half (54%) never by the JAHA. Thus the JAA visits his regular clients (65%) an average of 9 times a year, and the JAHA his (46%) an average of 4 times.

Table 6: Frequency of extension visits in 1973 by progressiveness in 1970

	visits by JAA				visits by JAHA			
	0	1-4	5+	TOTAL	0	1-4	5+	TOTAL
most progressive	23%	32%	45%	100%	39%	49%	13%	101%
upper middle	21	50	29	100	46	47	7	100
lower middle	39	35	27	101	59	24	7	100
least progressive	70	23	7	100	86	13	2	101
TOTAL	35%	36%	29%	100%	54%	38%	8%	100%
	X^2 = 59.2 p = .0000				X^2 = 47.1 p = .0000			

Even then, the distribution of visits across regular clients is extremely skewed. About one-third (36%) of all farmers are visited no more than 4 times a year, the other third (29%) receiving 5 or more visits. Of the 99 farmers visited 5 or more times, about half (42) are most progressive.

The final variable we wish to consider in this descriptive section is the frequency of visits to a Farmer Training Center. FTC's give short courses in agricultural subjects to farmers who have been recruited by the JAA. Course fees are 5 Kshs a week. For coffee courses, they are paid by the co-operative. The FTC course was the main extension method used in the SRDP project: the famous Wambugu FTC is located right in the heart of Tetu.

About two-thirds (69%) of all Tetu farmers have never visited the FTC. Those who did, visited the FTC an average of 1.7 times. However, the distribution is again extremely skewed. Half (49%) of the most progressives visited the FTC at least once, for an average of 3.5 times. For the upper middle and lower middle categories, these figures are respectively 35% 1.5 times and 24% for 1.6 times. Only 5% of the least progressives ever visited the FTC, one time.

Concluding this section, it seems safe to say that the additional 1973 snapshot information on the Tetu farmers can only strengthen the overal impression of the considerable disparity between them we had observed in 1970. Investments in land, education, business, labor and water favor the more progressives, as do Government interventions such as extension and credit. SES indicators show an already relatively large differentiation in this typically small farmer community. The most progressive earn a total income which is about three times that of the least progressive on average, while their income from agriculture is about six times that of the least progressive.

THIRTY MONTHS OF AGRICULTURAL DEVELOPMENT

In the present section, we shall present the result of our efforts to obtain a diachronic view of 2½ years of agricultural development in Tetu. As we said before, the second survey was an afterthought, so that the baseline study was not designed with a panel study in mind. In hindsight, we would have collected information on some variables which are highly relevant but were left out. It is not uncommon that researchers learn from their research how they should have carried it out in the first place. To say the least, we learned how much more difficult it is to process and analyse data for a panel study than for a single shot survey.

As it is, we collected information on three types of variables. In the first place, we studied the diffusion of innovations. We were very much interested in the question of mobility in innovativeness[1]. Also, our experience with hybrid maize, which had only been adopted by one-third of the farmers in 1970 since its introduction in the early sixtees, made us expect stagnation of diffusion. We dit not foresee the effect of the increase in farm-gate milk prices announced by the President in 1971. In the second place, we collected some information on the scale of operations, and thirdly, on factors of production, such as land, labor, water and information. We expected both these types of factors to provide some insight in the difference between diffusion of information, one the one hand, and the trickle down of benefits, on the other. Unfortunately, no information on socio-economic status had been gathered in 1970, as can be surmised by its presentation as "additional snapshot information" in the first part of the present paper.

1. The diffusion of innovations

Table 7 is a cross-tabulation of progressiveness in 1970 and the adoption of the eight innovations. Since the progressiveness score was calculated on the basis of adoption, the table is comparable to one which cross-tabulates categories of people with different lengths against the number of centimeters used to measure them in the first place. We present the table because it allows a comparison between percents of farmers in the different adopter categories adopting a specific crop in 1970 and 1973.

If we look at the totals, we notice some fairly astonishing developments. The percent of people adopting hybrid maize doubled (from 33% to 71%). More than a third (38%) of all Tetu farmers adopted it in a 2½ year span. This was not a completely autonomous development. The project in which we participated trained some 776 below average farmers in hybrid maize growing and gave supplies and credit for implementing the trainin, first on a half, and later, on one acre. Also, our evaluation showed that we could expect a diffusion effect of some 2.4 other adopters for every farmer trained in the same year, or a total of 1860 adopters, totalling 2600 farmers or about one-fifth of all Tetu farmers. In addition, the Government's 4K club program was carrying out a similar hybrid maize project for rural youth in the SRDP area.

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1) which we could not study due to difficulties in creating a 1973 progressiveness index.

Table 7 : Percent of Respondents adopting eight agricultural innovations in 1970 and 1973 by Progressiveness in 1970

		hybrid maize		coffee		macadamia		tea		pyrethrum		grade cattle		pigs		cert. potatoes	
		1970	1973	1970	1973	1970	1973	1970	1973	1970	1973	1970	1973	1970	1973	1970	1973
1.	most progressive	66%	85%	71%	66%	33%	36%	18%	22%	22%	20%	90%	94%	43%	52%	10%	15%
2.	upper middle	30	72	68	69	29	33	12	16	15	13.	71	89	27	29	4	14
3.	lower middle	24	70	32	38	12	21	8	14	8	11	46	73	13	25	1	3
4.	least progressive	4	49	4	9	2	9	2	7	5	7	16	40	4	14	-	2
	total percent	33%	71%	48%	49%	21%	26%	11%	16%	13%	14%	60%	78%	24%	31%	4%	9%
	base	114	243	163	168	71	89	37	53	45	46	205	265	80	107	14	31
	1 - 4	62	36	67	57	31	27	16	15	17	13	74	54	39	38	10	13

In hindsight, it is impossible to say whether the diffusion of hybrid maize had stagnated in 1970 and was pushed over the hump by the projects, or whether the projects simply rode a diffusion wave and were, therefore, successful[1]. In the course of the training project, we encountered many farmers who had heard of hybrid maize but had not understood what it was all about, let alone that they knew how to go about adopting the crop. Having heard of it definitely increased their readiness to adopt. However, we feel that the SRDP projects greatly accelerated hybrid maize adoption and suggest that rapid agricultural development might be obtained as much by the systematic promotion of partly adopted innovation among non-adopters, as by introducing new innovations to the same old progressive farmers.

Returning to Table 7, we notice that the increase in hybrid maize adoption was more marked amoung the lower middle and least progressive categories (resp. 46 and 45%) than amoung the upper middle and most progressive categories (resp. 42 and 19%). Amoung the latter a ceiling effect is probably at work. There is no doubt that the less progressive categories are catching up, although the higher percents of adopters can still be found in the more progressive categories.

In all, the figures on hybrid maize show how fast small farmers can move.

If we turn now to coffee, we see no development at all. This is not surprising since coffee quota actually prohibited further diffusion so that a farmer could only adopt if he bought coffee bushes from somone else. We do observe a slight sale by the most progressive to the lower middle farmers. Coffee prices were very bad at the time, a fact only accerbated by creaming-off processes in the various levels of the coffee co-operative. In fact, the figures may indicate that the most progressive have been quicker to react to the low prices than oters. It would be interesting to study the effect of the present price hikes as a result of the Brazillian frosts.

Macadamia nuts have not moved much, which is not surprising since shelling facilities still had not become available at the time of study.

Tea is limited to the higher and wetter areas in Tetu so that about 200 respondents are barred from adopting it. Tea Production is completely controlled by

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1) We did use controls in our experiment. However, we only compared our experimental subjects with a sample of Tetu farmers, so that we cannot say for Tetu as a whole what would have happened to hybrid maize adoption without the project. For that, we would have needed a control area outside Tetu.

the Kenya Tea Development Authority, an international showcase of small farmer development (Uma Lele, 1975). It has processing factories to which freshly picked tea leaves are transported daily by KTDA lorries across tea roads. Farmers planting tea are advised and supervised by special tea extension workers, who are better trained and supervised than regular extension staff. The diffusion of tea planting is a highly controlled process called a "tea selling campaign", during which a specific number of potential growers is invited and assisted to buy planting material for about an acre from KTDA. Such a campaign took place as a SRDP activity in Tetu. The percent of growers in the tea zone jumped from 40 to 51%, while some expansion also occurred in the grade cattle areas, where the percent of growers increased from 2 to 12%. Table 7 shows that the tea campaign benefitted all categories more or less equally.

Pyrethrum did not show much improvement, the likely result of the drop in prices after American disengagement in Vietnam, where mosquito coils had been used on a large scale by the US army.

Grade cattle provide another fascinating picture of what small farmers can do. First introduced in Tetu in the late fortees in Ihururu, a sublocation near the Aberdare National Park, by an enthusiastic chief who was later killed by his own prize bull, grade cattle made steady progress. By 1970, about three quarters of the farmers in the higher and wetter areas of Tetu had adopted grade cattle, and half the farmers in the dry, low coffee/maize areas. The increase in milk prices had a dramatic effect in the area. The Kenya Cooperative Creameries lost money because it had to buy more than it could sell and had to dump milk. Government was actually trying to prevent the diffusion of such promising innovations as feedlots.

The response of the small farmer is obvious from Table 7. About one-fifth (18%) of the Tetu farmers adopted grade cattle in the 2½ year period, that is more than 2000 farmers. Adoption in the high wet areas jumped from about 75% to about 85% and in the low, dry areas from 50 to 72%. The most progressive are reaching capacity, while adoption in the other three categories rose by respectively 18, 27 and 24%. The innovation seems to be diffusing rapidly, also to the least progressive.

Similar developments, though less dramatic, are taking place in case of pigs, for which a good market is developing through breakfast sausages for city folk. The development of potatoes is slow and hampered by the insufficient provision of certified seed. Where, as in Muruguru sublocation, extension makes efforts to provide seed, adoption may be rapid (33% in Muruguru in 1970).

Summarising our findings on the eight innovations, we can say: 1) that small farmers are able and willing to respond very quickly to opportunities offered to them, and 2) that profitable innovations are diffusing to all categories of progressiveness. In fact, the less progressive seem to be catching up, as diffusion theory would lead us to expect.

One likely reason why diffusion may not lead to a trickle down of benefits is that the quality of adoption deteriorates as the innovation diffuses to less progressive farmers. A typical example would be the adoption of the complete hybrid maize package (seeds, fertiliser, insecticides and proper practices) by the more progressive, while the less progressive would only replace local seed by hybrid seed, ceteris paribus.

Table 8 gives some evidence on the extent to which such processes occur in case of hybrid maize. The percents refer only to those actually growing the crop in a given year.

Table 8: Percent of hybrid maize growers using fertiliser and insecticides in 1970 and 1973, by progressiveness in 1970.

	fertilisers		insecticides	
	1970	1973	1970	1973
most progressive	98%	96%	61%	49%
upper middle	93	99	50	49
lower middle	87	93	44	38
least progressive	100	86	-	25
Total Percent	95%	95%	54%	43%
Base (growers)	114	243	114	243

The table indicates that the great increase in the number of growers has not led to a dramatic drop in the quality of adoption. In both years, nearly all (95%) growers use fertiliser, although the figures say nothing about the type and quantity. The use of insecticides has dropped somewhat (54% to 43%), also amoung the most progressive .... which raises the possibility that insecticides are not so necessary after all, or only in a specific ecological zone. Although scrutiny

of the 1973 data suggests that the proportion of farmers using the contingent innovations drops with progressiveness, these is no indication of increasing disparity between 1970 and 1973.

The deterioration of the quality of adoption also seems slight in case of dairy practices. We obtained information on nine practices in both years. They allow the construction of Guttman scales for both years, which are very similar except for the relative positions of a few items[1]. In order of increasing "difficulty" the scale items are: possesses pasture, uses dips or sprays against ticks, uses veterinary services, uses artificial insemination, feeds fodder, has fenced perimeter, washes udder, has paddocks and feeds concentrates. Given the scaleability of the items, we suffice by presenting the number of dairy practices followed (Table 9).

Table 9: Mean number of dairy practices in 1970 and 1973, by progressiveness in 1970 (A total of nine practices).

	1970	1973
most progressive	7.0	7.8
upper middle	6.4	7.5
lower middle	6.0	7.6
least progressive	5.1	6.1
Total	6.5	7.5
Base (grade cattle keepers only)*)	204	262

*) Four missing observations

The average grade cattle keeper has adopted one more dairy practice in 1973 than he did in 1970, although the percent of grade cattle keepers in Tetu has increased by 18%. Looked at this way, diffusion of grade cattle has been accompanied by an increase in the quality of adoption. In fact, these has been a rapid diffusion of dairy practices. The percent of grade cattle keepers with

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1) 1973: nine items, coeff. of rep. = .92; min.marg.repr. = .87; % improvement = .05, coeff. of scaleability = .38
1970: nine items, coeff. of repr. = .90, min.marg.repr. = .83, % improvement = .07, coeff. of scaleability = .41.

five or fewer practices dropped from one-fourth(24%) in 1970, to 8% in 1973. The percent adopting 8 or 9 increased from one fourth(27%) to almost two-thirds(62%). Yet for both years (table 9), the average number of practices decreases with progressiveness, although there is no evidence of increasing disparity.

2. Scale of operations

One important reason why diffusion may not lead to trickle down of benefits, and may even lead to greater disparity, is the scale of operations. The farmer who buys ten dairy cattle in the same year as the other buys two, obviously benefits more, if grade cattle are a profitable innovation that is. Given that farmsize and progressiveness are strongly correlated in Tetu, we need to look at the scale of operations in our effort to reconcile the rapid diffusion of profitable innovations we observed and the seemingly large disparities which are suggested by the 1973 snapshot of the socio-economic status of Tetu farmers.

If one looks at the mean number of acres planted with the most important crop innovations (Table 10), it is obvious from the totals that the scale at which Tetu farmers adopt is small and hardly exceeds an acre. Also, there is little change between 1970 and 1973 for maize, notwithstanding the large increase in the number of growers. Tea decreased slightly because the new growers have a smaller acreage.

Table 10: Mean acres planted with crop innovations in 1970 and 1973, by progressiveness in 1970

	hybrid maize		coffee		tea		pyrethr.		certif. potato	
	70	73	70	73	70	73	70	73	70	73
Most progress.	1.3	1.4	1.0	0.9	1.3	1.2	0.3	0.3	0.5	0.5
Upper middel	0.9	1.1	0.7	0.7	0.9	0.9	0.4	0.3	0.2	0.4
Lower middle	0.7	0.9	0.4	0.5	0.8	0.6	0.4	0.5	-	0.2
Least progress.	0.7	0.9	0.5	0.4	0.7	0.6	0.1	0.3	-	0.3
TOTAL	1.1	1.1	0.7	0.7	1.1	0.9	0.4	0.3	0.4	0.4
Total growers	114	243	163	168	37	53	45	46	14	31

The comparison of the size of operation in the progressiveness categories also shows a relatively homogeneous situation. Differences between categories are slight across the two years. Yet for both years, the most progressive tend to have about half an acre more of hybrid maize, coffee and tea than the lower middle and least progressive categories. Half an acre does make a difference on a total size of operation for each crop of one acre or less, especially if one takes into account the fact that the more progressive have also benefitted longer from the innovation.

On the other hand, the size of operation of the most progressive did not increase for any of the crops, except maize, in the 2½ year period. In case of maize, the size of operation of the other categories increased more than that of the most progressive. For tea, the size of operation decreased across the board. Seizing up the figures, there is an indication of existing disparity, but no indication of rapidly increasing disparity.

Let us take a closer look at hybrid maize. Our figures allow us to estimate that a total of 4360 acres of hybrid maize was grown in Tetu in 1970. In 1973, the total acreage was 9370, or more than double the 1970 figure. The 17% least progressive grew about 900 acres or 10%, while the 27% most progressive grew about 3860 acres, or 41% in 1973.

If one considers the distribution across size of operation categories for the two years (figures not reported here), one notices an increase of 5% in the number of people trying out one-third of an acre or less of hybrid maize, as can be expected in a period of rapid diffusion. There is also a 10% increase in the number of people planting more than the mean acreage (1.1 acre). About twice as many most progressive (40%) plant 1.1 or more in 1973 as least progressive (22%). However, the increase between 1970 and 1973 in the 1.1 acre and over category is inversely related to progressiveness, with the bottom two categories increasing 20% and the most progressive 3%. These findings reinforce the impression of present disparity while not allowing prediction of greater disparity in future.

In 1970, there were some 31000 grade cattle (cows, steers, bulls, heifers, calves and cows) in Tetu Division. By 1973, the number had grown by 13800 to a total of 44800, an astonishing increase of about 45% in 2½ years. It shows what price policy can do. One actually wonders where all the grade cattle came from, even if one discounts the fact that most "grade" cattle are improved

cross-breeds[1].

Who benefitted from all this growth? Table 11 reports the mean number of grade cattle in the different categories.

Table 11: Mean number of grade cattle kept in 1970 and 1973, by progressiveness in 1970

	1970	1973	difference
Most progressive	5.2	5.9	.7
Upper middle	4.1	4.9	.8
Lower middle	3.3	4.1	.8
Least progressive	2.6	3.0	.4
Total	4.3	4.8	.5
Base (those who ever kept grade cattle)	205	265	

Even though the number of grade cattle keepers increased by 18%, the average herd size increased by .5 animal. In both years, the more progressive clearly had the larger herds, with the most progressive averaging a herd twice the size of the least progressive. The trend does not seem to diminish these differences. In fact, all categories increased their herds more or less equally, except the least progressive who lagged behind.

The frequency distribution across herd size categories only reinforces this conclusion. Starting with the most progressive, the proportion having an above average herd of 6 or more animals, increased by respectively 7, 11, 8 and -1% in the different progressiveness categories.

3. Factors of production

There are few among the 2000 odd empirical diffusion studies which do not document that progressiveness is strongly correlated with farmsize. Differences

1) In fact, the Dutch Government was assisting the improvement of the Kenyan dairy herd by flying out Frisian heifers in the early seventees. The then Netherlands agricultural attaché enjoyed himself tremendously on one of these trips, crawling over the backs of the animals every time he had to go to the toilet in the back of the place.

in farmsize can explain increasing disparities, all other factors remaining constant. With farmsize being such an important issue, we took pains to collect comparable information in 1970 and 1973 (Table 12).

Table 12: Mean farmsize in 1970 and 1973, by progressiveness in 1970

	1970	1973	difference
Most progressive	9.1	9.4	.3
Upper middle	7.0	7.4	.4
Lower middle	4.0	4.8	.8
Least progressive	2.6	3.4	.8
Total	6.0	6.5	.5
Base	341	341	

If we look at the totals, we observe a highly unexpectly result: Average farmsize has increased by half an acre! This implies that, among them, Tetu farmers had a total of 6000 acres of land more in 1973 than in 1970. Although we checked our figures carefully, we cannot but draw that conclusion. We find it difficult to explain the finding. The 13 respondents we lost between 1970 and 1973 explain no more than about 50 acres, or, assuming such drop-out for the whole of Tetu, 1750 acres.[1] Since the question referred to ownership of land in Tetu Division, the finding cannot be explained by land ownership in other areas. Possible explanations, are: 1) the taking into production of unallotted or unused land, such as steep hillsides. We have seen many of them being cleared in Tetu.[2]

1) We mention this point although it could not affect our figures. We studied the same 341 farmers in both years.

2) Analysis of the data by ecological complex shows that farmsize remained more or less constant in the low coffee areas, but that the proportions of farmers with small farms decreased especially in the hilly, high attitude, tea and grade cattle areas.

2) Double counting by the fact that some people mentioned land they rent while others mentioned it as land they own. This is unlikely, however, since the question asked for ownership. 3) An artifact of our method. However, the systematic nature of the frequency distributions, to be discussed later, seems to rule out that possibility also. It would be highly relevant for our understanding of the dynamics of rural development to carry out further research on this question.

With nowhere else to go, and having adopted all profitable innovations around, all a small farmer can do is to try to get more land. How does he go about getting it? Such a research question seems especially interesting in few of the

fact that table 12 seems to suggest that the less progressive categories of farmers seem to benefit most from the overall increase in acrease. While farmsize still correlates strongly with progressiveness, also in 1973, the two less progressive categories increased their farmsizes with .8 acres, while the more progressive categories only averaged .4 or less. The findings seem again to reflect existing, but not increasing, disparity.

The findings require that we look at the frequency distribution (Figure 3). Even if one only takes into account the 1973 figures, the inequity of the distribution of farmland is obvious. But Figure 3 can only reinforce our impression of decreasing disparity when it comes to farm land.

For all categories, it seems that the proportion of farmers with 2 acres or less has diminished. Overall, this categorie dropped 5%, 1% for the most progressive, and respectively 5, 6 and 12% for the other categories. Whereas 51% of the least progressive had 2 acres or less in 1970, that percentage dropped to 39% in 1973.

As we saw before, the more progressive had, since 1959 when all Tetu farmers had one plot of land, been able to acquire more plots of land than the less progressive.

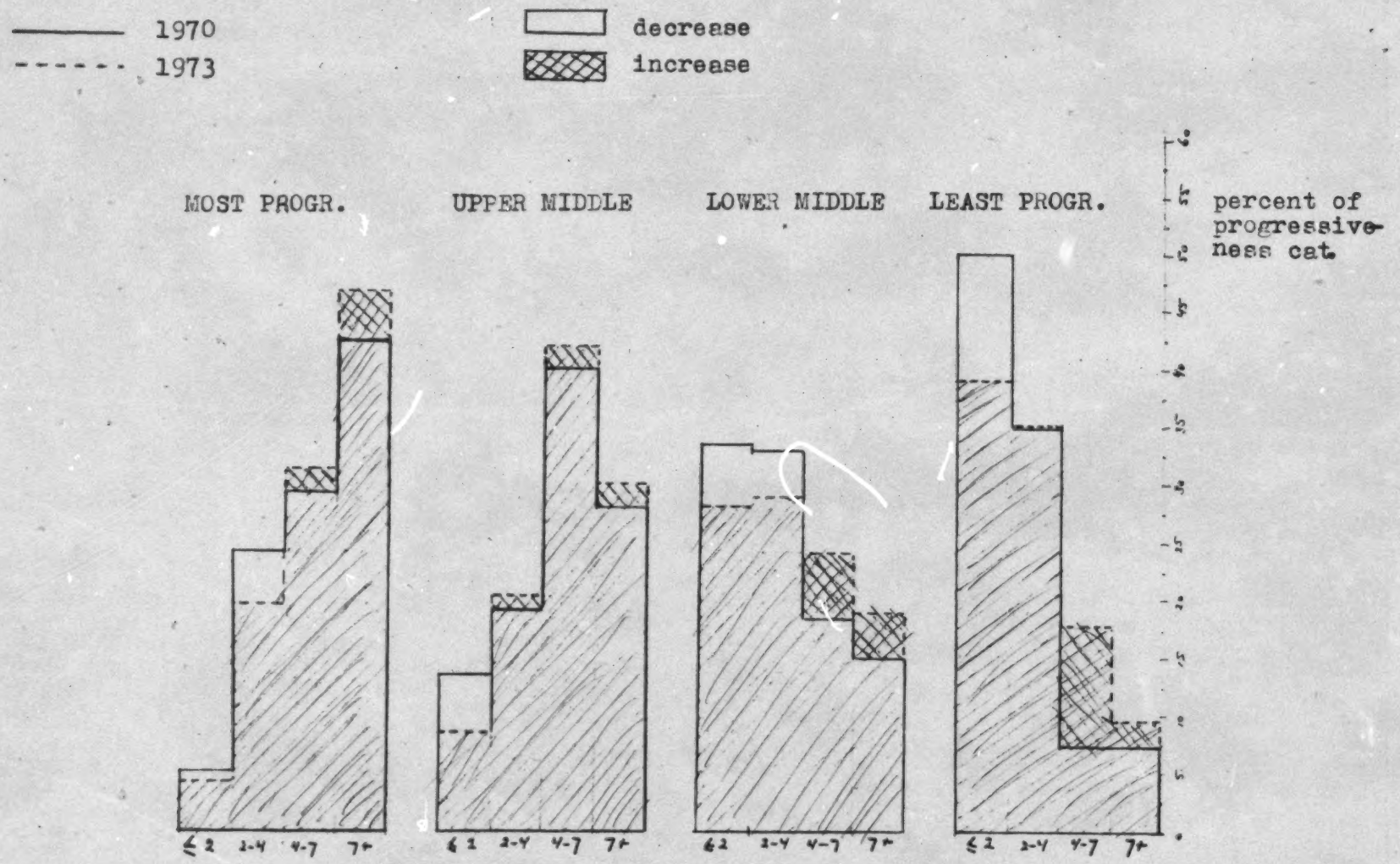

Figure 3: Distribution of respondents across farmsizes in acres in 1970 and 1973, by progressiveness in 1970

Table 13 shows that fragmentation is still going on, with the average number of plots growing from 1.3 to 1.4 in 2½ years. However, the two less progressive categories have obviously acquired more plots (resp. .17 and .19) than the more progressive categories (resp. .12 and .11). The percents of people in the less progressive categories owning only one plot dropped respectively 18 and 21%, those in the more progressive categories respectively 11 and 12%.

Table 13: Mean number of plots owned in 1970 and 1973, by progressiveness in 1970.

	1970	1973	difference
most progressive	1.57	1.69	.12
upper middle	1.29	1.40	.11
lower middle	1.15	1.32	.17
least progressive	1.07	1.26	.19
Total	1.29	1.43	.14

Although our snapshot question about the purchase of additional plots of land had clearly shown that more of the relatively more progressive had bought land in the past, our diachronic data show again that one cannot speak of increasing disparities in case of land. Rather, the opposite is the case.

Water is an extremely important development issue in Tetu. This is not only due to the marked dry season, but also to the difficulty of providing water near the farm in this hilly, if not mountainous, area. Anyone who has seen Kikuyu women hauling their heavy oildrums with water up the steep slopes would expect this to be the main cause of the lively interest in water provision. However, the main issue seems to be grade cattle. Driving one's costly cows daily to a river increases their chances of getting tick-borne fevers and other diseases from local animals, while the long walks waste their energy.

Table 14 shows the changes in the availability of an on-farm water supply in the 2½ year period. Communal water supplies include rivers (used by 75% in 1973), wells or boreholes (10%) or village taps (4%). On-farm water may include a rainwater tank (18%), connection to a reticulation scheme (7%), a borehole (2%) or an on-farm river or well (7%). We have separated this last source of on-farm water from the first three which result of human design.

Table 14: Percent of respondents using different sources of water in 1970 and 1973, by progressiveness in 1970.

	communal		on farm river, well.		on farm raintank, retic.scheme, borehole	
	1970	1973	1970	1973	1970	1973
most progressive	97%	81%	3%	6%	21%	50%
upper middle	94	95	3	4	8	21
lower middle	98	89	-	3	7	27
least progressive	95	93	7	2	4	10
Total*)	97%	89%	3%	5%	12%	27%
Base	326	304	10	14	37	98

*) Respondents may use both on-farm and communal water supplies

One-quarter (27%) of all Tetu farmers had a man-made on-farm water supply in 1973, although nearly nine-tenth (89%) were still (also) using communal sources. This represents an increase of 15% in 2½ year. The figures suggest that there is an increasing disparity in terms of on-farm water supply. The proportion of most progressive having on-farm water increased from one-fifth (21%) to half (50%), while especially the least progressive seem to be slow in following.

Use of farm labor has some important implications for rural development and rural employment in a country where employment is the number one priority (at least in 1973). Also, developments in labor use might give some clues about future development: Is Tetu's development following the Swynnerton plan (1954), according to which progressive African farmers would develop and provide employment for the rest? Are there indications that smaller, less progressive farmers are becoming increasingly involved in providing labour for the more progressive, larger farmers?

Table 15 gives the mean number of laborers of different types used. One must remember that all these figures are based on very crude recall data and are in no way comparable to the results of careful farm management studies.

Table 15: Mean number of laborers of different types employed in 1970 and 1973, by progressiveness in 1970.

	full-time		part-time		seasonal		household	
	1970	1973	1970	1973	1970	1973	1970	1973
most progressive	.4	.4	.2	.8	3.5	3.1	2.8	2.5
upper middle	.3	.2	.2	.5	3.0	2.4	2.8	2.8
lower middle	.2	.1	.3	.3	1.4	1.7	2.4	2.3
least progressive	.0	.0	.0	.0	0.5	0.7	2.1	1.9
Total	.24	.18	.2	.4	2.3	2.1	2.6	2.4

It is clear from the totals that change is taking place. The number of household laborers (which includes the farmer himself) has dropped by .17 laborer per household, implying a loss of 2000 odd from the roughly 30,000 employed in Tetu in 1970. The drop comes especially from the decrease in the proportion of farmers who employ 3 or more household laborers. This drop occurs in all categories of progressiveness.

The number of full-time paid laborers was about 2000 in 1973. It represents a drop of .06 full-time worker per farmer or some 700 in the whole of Tetu in 2½ years. Although a relatively small number, it would still be comparable to the shut-down of a fair sized industry.

The average number of part-time laborers increased by .23 per farmer thus creating 2800 part-time jobs in Tetu, a more than 100% increase of the number in 1970 (2300). Possibly by accident, the increase in part-time labor use completely offsets the loss in full-time and household labor.

Seasonal labor seems to be used a lot in Tetu, although estimates of total numbers would be meaningless. We have no way of controlling whether the same seasonal laborer was employed by different farmers for a few days each, for instance. However, the use of seasonal labor seems to be decreasing if one looks at the overall figures.

When we look at the figures for the different progressiveness categories, we notice, apart from the consistently higher labor use among the more progressive, that the use of part-time labor has especially increased in the most progressive and upper middle categories by respectively .5 and .3 laborer. At the same time, an interesting development is occurring in case of seasonal labor. The more progressive categories decreased their use of such labor by respectively .4 and .6, while the less progressive categories increased theirs by .3 and .2 respectively.

These findings could be interpreted to imply that more local Tetu people are employed as part-time laborers by more progressive farmers, while the less progressive, who do some of that work, have to hire seasonal labor to keep their own farms in operation. However, this interpretation may be farfetched. After all, we have no information whatsoever about the many landless in Tetu, for instance.

Table 16 gives the percents of resondents in different categories employing different types of labor.

Table 16: Percent of respondents employing different types of laborers in 1970 and 1973, by progressiveness in 1970.

	full-time		part-time		seasonal		more than 1. household l.	
	1970	1973	1970	1973	1970	1973	1970	1973
most progressive	28%	25%	6%	23%	76%	69%	76%	66%
upper middle	18	12	6	14	68	63	79	75
lower middle	15	10	4	12	38	46	71	65
least progressive	2	2	0	0	14	23	57	55
Total*)	17%	13%	5%	13%	53%	53%	73%	67%

*) The table was composed of a number of frequency distributions, in order to save space. The table is"inclomplete" in that proportions of resp. not employing labor have been out.

The table makes clear that most farmers still rely on household laborers (67%), followed by seasonal labor (53%), while a relatively small proportion uses full time and part-time labor (13% each). Scrutiny of the movement in the progressiveness categories only reinforces our earlier observations, although the frequencies show that farmers in the lower middle category have also started

to use part-time labor.

Information is an important production factor which might be in scarce supply indeed. Table 17 shows developments in case of extension contact in the past year, a crude measure to be sure. Looking at the totals, one is struck by the sharp drop in contact. Only the proportion having initiated contact with the JAHA seems rather stable.

Table 17: Percent having contact with extension "since the same time last year" in 1970 and 1973, by progressiveness in 1970.

	Visit by JAA		Visit to JAA		Visit by JAHA		Visit to JAHA	
	1970	1973	1970	1973	1970	1973	1970	1973
most progressive	100%	76%	82%	34%	91%	62%	87%	71%
upper middle	98	80	63	26	77	54	62	62
lower middle	87	63	58	23	64	38	52	54
least progressive	42	28	19	5	23	14	16	14
Total	86%	66%	59%	24%	68%	45%	58%	54%
Base	293	224	202	81	232	154	198	184

Several reasons can be suggested for the decrease. For one, the Ministry of Agriculture initiated an intensive three-months JAA training course in which nearly all JAA's participated. The course took them away from their regular duties. Secondly, the various SRDP projects kept especially the JAA's from their regular work and focussed them on specific experimental groups. A third possibility is that the ongoing diffusion processes are having two consequences : 1) more other farmers are being used as sources of information as the less progressive begin to innovate, and 2) the adoption of innovations by more farmers requires that extension workers spend more time on the maintenance of adopted innovations and less on promoting innovations. Maintenance would require more visits each to a smaller number of farmers. We saw in table 5, that the JAA visited his regular clients in 1973 (65%) an average of 9 times a year, and the JAHA his (46%) an average of 4 times. Unfortunately we have no comparable information for 1970. More research will be necessary on this issue.

Table 17 does not show a proportionally greater decline in extension contact for the less progressive. In fact, the opposite seems to be the case. Of course, the more progressive also remain favored in 1973, but the disparity is not increasing.

A similar picture emerges from the attendance of group extension meetings (Table 18). Contacts decrease for demonstrations but increase for family planning meetings and FTC courses. In case of FTC attendance, this may be partly due to our experimental efforts. The figures do not suggest an increasing disparity. Again the opposite seems to be true.

Table 18: Percent attending group extension meetings in 1970 and 1973, by progressiveness in 1970.

	agric crop demonstr.		animal h. demonstr.		fam.planning meeting		FTC course	
	1970	1973	1970	1973	1970	1973	1970	1973
most progressive	91%	58%	87%	51%	24%	24%	47%	50%
upper middle	73	54	70	39	10	14	22	35
lower middle	65	40	62	33	2	20	14	24
least progressive	37	23	32	12	4	12	5	5
Total	70%	46%	66%	36%	10%	18%	24%	31%
Base	238	157	225	123	35	61	82	105

Information also comes through mass media, although the Kenyan mass media usually carry little of direct relevance to small farmers. Table 19 gives some information on mass media exposure.

Table 19: Proportion of respondents that says never to be exposed to various media in 1970 and 1973, by progressiveness in 1970.

NEVER exposed to:	television		radio		newspapers		magazines	
	1970	1973	1970	1973	1970	1973	1970	1973
most progressive	32%	60%	0%	14%	10%	44%	12%	54%
upper middle	46	70	0	14	13	59	13	56
lower middle	52	68	2	21	16	54	28	62
least progressive	58	79	5	40	26	35	35	77
Total[*)]	46%	68%	2%	20%	15%	55%	21%	61%

*) To save space, the table was composed of different contingency tables, so that the table is incomplete and does not show those with exposure for the various media.

An astonishing drop in media exposure is evident. We have no explanation from this phenomenon, except that the time of the two interviews might have made a difference. In 1973, we interviewed in March, the onset of the rains. In 1970, we interviewed in November, when people have lots of time.*)

The increase in the proportions of people never exposed does not seem systematically related to progressiveness, except in case of radio.

The membership of various organisations is undergoing considerable change (table 20).

Table 20: Percent being member of selected organisations in 1970 and 1973, by progressiveness in 1970.

	co-operatives		4K Clubs		Harambee		Church	
	1970	1973	1970	1973	1970	1973	1970	1973
most progressive	99%	95%	22%	26%	93%	42%	42%	82%
upper middle	95	96	12	12	89	55	34	80
lower middle	59	76	5	12	79	42	38	76
least progressive	11	23	0	11	68	35	21	68
Total	72%	78%	11%	16%	84%	45%	35%	77%
Base	244	265	36	53	286	152	120	264

Memberships in co-operatives increased by 6%, of which the majority can probably be attributed to the increase numer of tea growers (5%). The less progressive seem to be catching up in co-op membership. The 4K programme had been very active in Tetu's SRDP. Membership increased 5%, especially among the less progressive.

The most interesting developments are those in Harambee and church membership. Harambee groups are self-help groups which voluntarily tax themselves to acquire such public facilities as cattle dips, secondary schools, and of recent, Institutes of Technology. Harambee projects have tended to become increasingly large and expensive, increasingly under the control of politicians

*) The question was worded as follows: "how often do you...listen to the radion...." etc. Answer categories were: daily, few times a week, few times a month, rarely, never.

and covering increasingly larger areas. The Institutes of Technology are district-wide projects. According to Mbithi and Almy (1972), who studied Harambee in Tetu, people were becoming disenchanted with Harambee and also taxed to the limit of what they can bear. Table 20 shows that membership in Harambee groups has dropped about 40% in the 2½ years.

In the same 2½ year period, church membership rose 40%! We have no ready explanation for this phenomenon. Although Tetu people are religious (family planning efforts meet resistance on religious grounds, for instance), and although we have seen some signs of religious fervor*), it seems an unlikely reason for religion to spread as fast as hybrid maize. More in line with Kikuyu character would be to look for the explanation in the highly successful credit/saving union started recently by the church.

CONCLUSION

We have looked at two-and-a-half years of change in a rural area in Kenya. The first conclusion must be that our diachronic study uncovered a very dynamic situation, a far cry from the usual image of peasant society.

In the relatively short time span studied,more than one-third of the Tetu farmers adopted hybrid maize, while about 5000 additional acres were planted, more than doubling the 1970 estimate. One-fifth of the Tetu farmers adopted grade cattle, while the total number of grade cattle grew by 13800 to 44800, an increase of 45% over the 31000 in 1970. Farmsizes, which we had assumed least likely to change, increased by an average of half an acre, representing an increase of roughly 6000 acres for Tetu as a whole. The number of farmers who enjoy an on-farm water supply increased by more than 100%, so that one-quarter of the Tetu farmers now has either a raintank or is connected to a reticulation scheme. The pattern of labor use is rapidly changing: about 2700 fewer full-time and household laborers were employed in 1973 compared to '70, while the number of part-time laborers increased by about the same amount. Harambee is becoming rapidly defunct, while the church is rapidly gaining strength.

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*) During the SRDP farming training courses we were struck by the fact that local evangelists immediately made use of the captive audience in the evenings to preach the gospel. In fact, they had the crowd praying before meals at the end of the training period. Courses also ended with prayer.

With such goings on, and especially considering the rapid agricultural growth, the question which comes to mind is : what is the effect on equity? All our information on socio-economic status and related indicators seem to show a fairly large disparity between more and less progressive farmers. What interested us in particular was whether the disparity was increasing. Does the rapid development in the 2½ years lead to increasing gaps between rich and poor? Our hypothesis had been : Yes!

Unfortunately, we can only offer information on some indicators. No income data were, for instance, collected in 1970. What, then, did we find?

1) The diffusion of profitable innovations is progressing rapidly. The less progressive are catching up. There is no sign of stagnation. Both SRDP and milk prices seem to have had considerable impact in this respect.

2) The quality of adoption does not seem to change much as less progressive farmers begin to adopt the innovations.

3) There is no evidence of increasing disparity in the scale at which crop innovations are adopted, while the evidence is only slight in case of grade cows.

4) There is evidence of decreasing disparity in terms of farmsize, in that the proportion of farms of 2 acres or less is decreasing, while the number of plots owned is increasing more rapidly among the less progressive than the more progressive.

5) The development of on-farm water supplies shows an increasing disparity.

6) The use of part-time labor has increased especially among the more progressive, while their use of seasonal labor has dropped. The use of seasonal labor has increased among the less progressive, leaving open the possibility that more local people are employed by the more progressive. If true, the development would imply a basic change in the character of the present society.

7) Changes in extension contact do not suggest an increasing emphasis on the more progressive, although that finding may have been contaminated by our own efforts to get extension to focus on less progressive farmers also.

In all, we have not found unambiguous evidence of rapidly increasing disparity, although the labor question requires further research. Maybe we have not looked in the right places. After all, the more progressive have more of

everything, while they invest more, get larger loans and have enjoyed the fruits of various innovations for a longer period. Logically they should derive more benefit than the less progressive.

In short, we feel we have not disproved our hypothesis of increasing disparity. What we have shown is that some factors, such as the quality of adoption, the scale at which adoption takes place and especially farm size, which seem all likely to cause disparity, do not function that way, in Tetu at least. Further research is necessary to study the effect of other likely factors, if one wants to get to the bottom of the relationship between the diffusion of innovations and the trickle down of benefits.

Also, long run studies are necessary to study such phenomena as migration from the rural areas. Our data on secondary education suggest that the more progressive may also leave the rural areas, which would have an equity promoting effect. A similar effect can be expected if larger farms are more likely to be split up among sons than smaller farms.

Finally, we wish to point out that our data suggest that the less progressive are not a bunch of fat..istic, apathetic and traditional hard-cores, but a group of people which is struggling very hard to also get somewhere.

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